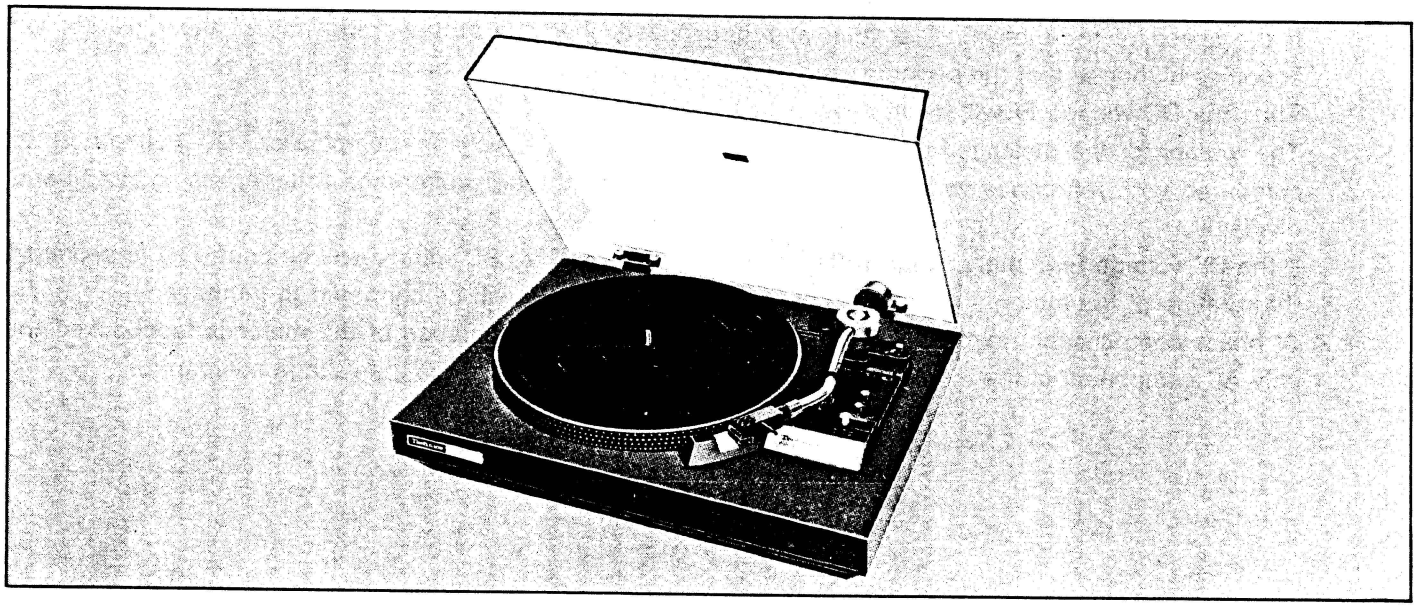
ORDER NO. SD7509-1040

Service Manual

Player

SL-23-(X)



Specifications

TURNTABLE SECTION

Type:	F. G. SERVO PLAYER, Auto return
Driving method:	Belt drive
Motor:	Dc motor with F. G. SERVO
Turntable platter:	Aluminium die-cast, 30cm (12") diameter (with Strobo)
Turntable speeds:	33-1/3 and 45 r.p.m.
Wow and flutter:	0.05% W.R.M.S (JIS C5521) 0.08% W. zero to peak (DIN 45507)
Rumble:	−40 dB (DIN-A), −65 dB (DIN-B)
Speeds change method:	Electronic change

TONEARM SECTION

Type:	Universal "S" shaped tubular arm, Static-balanced type, Direct reading tracking force adjustment, Anti-skating force control and Viscous damped cueing lever
Effective length:	220mm (8-21/32")
Overhang:	14mm (36/64")
Tracking error angle:	Within +3° (at the point 150mm or 5-1/8" from the center) Within −0.2° (at the point 55mm or 2-3/16" from the center)
Offset angle:	22°
Adjustable tracking force range:	0 to 4g
Cartridge weight range:	13 to 17g (included head shell weight)

CARTRIDGE SECTION

Type:	Moving magnetic stereo cartridge
Frequency response:	20 to 25,000 Hz
Output voltage:	3.2 mV (50mm/sec. 1 kHz, lateral) 4.5 mV (50mm/sec. 1 kHz, 45°)
Channel separation:	25 dB at 1 kHz
Channel balance:	Within 2 dB at 1 kHz
Load impedance:	50 to 100 kΩ
Tracking force:	1.75 ± 0.25g
Replacement stylus:	EPS-270ED

GENERAL SECTION

Power supply	~110/120/220/240V, 50 and 60 Hz
Power consumption	3W
Dimensions (W×D×H)	42.8×34.8×13.5cm 16-55/64×13-45/64×5-5/16 inches
Weight	6.5kg (14.3 lb.)

* Specifications are subject to change without notice for further improvement.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka, Japan

BLOCK DIAGRAM OF THE F·G·SERVO

* The output frequency which occurs at the F·G·section is in proportion to the rotation of the motor. And this output frequency is amplified and converted to rectangular wave at pulse shaping circuit.
* This wave is converted to trigger pulse and converted to rectangular having constant amplitude and constant time base of Ts.
* This rectangular wave is in proportion to the rotation of the motor, too.
* At next integrating circuit, this wave is converted to DC voltage Ti. This circuit controls the rotation of the motor by changing the voltage.

  If the speed of the motor is fast than standard speed, then the output frequency of the F·G·section becomes higher so that the periodic time T of the constant time base becomes narrow, too.

  Thus the DC voltage Ei will be increased.

  The rotation of the motor is in proportion to DC voltage Ei. At voltage comparator, DC voltage Ei is compared with refference voltage Es/n which is supplied through refference voltage reising circuit and divider.

  If the DC voltage Ei is higher than refference voltage Es/n. This DC voltage will be controled to decrease the rotation of the motor, and if lower than Es/n, DC voltage Ei will be controled to increase.
* At phase compensating circuit, to get more stable and accuracy rotation of the motor is feedbacked the only AC component of the output signal from the motor driving circuit to the voltage comparator.

BLOCK DIAGRAM OF THE F.G. SERVO

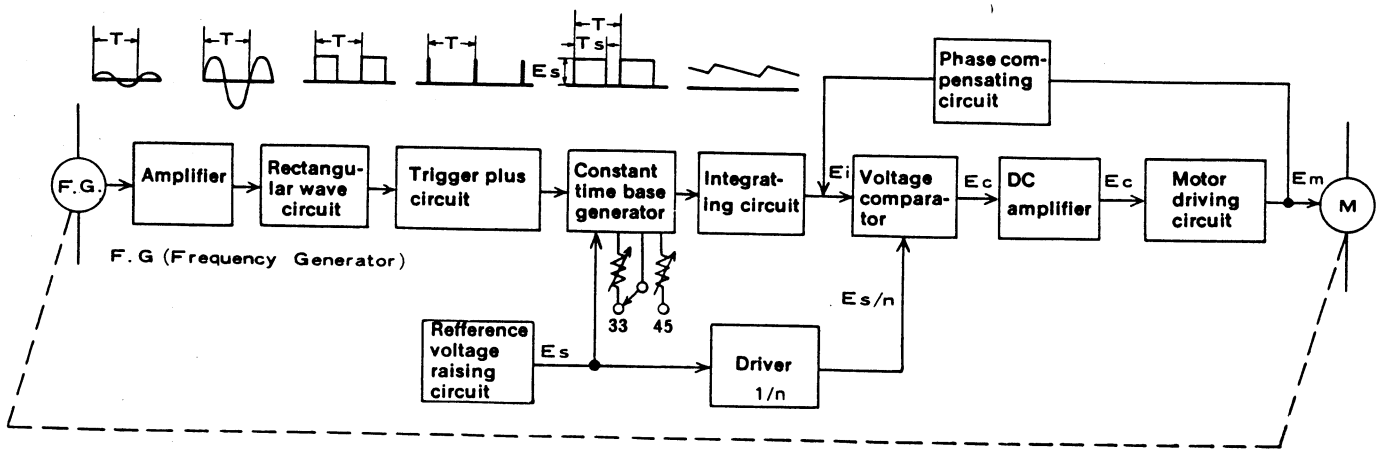


Fig. 1

ADJUSTMENT INSTRUCTION

1. ADJUSTMENT OF THE ARM LIFT HEIGHT

* The interval (the space between the stylus tip and record surface when the cueing lever is raised) of this tonearm has been adjusted from 5 to 10mm (3/16" to 25/64").
* If, for any reason, the space is too narrow or wide, turn the adjustment screw clockwise or counterclockwise pushing the arm lift.

NOTE:

* This screw has hexagonal head shape, so be sure to push the arm lift when you turn this screw.
  Clockwise ..... The space will be narrow.
  Counterclockwise ..... The space will be wide.

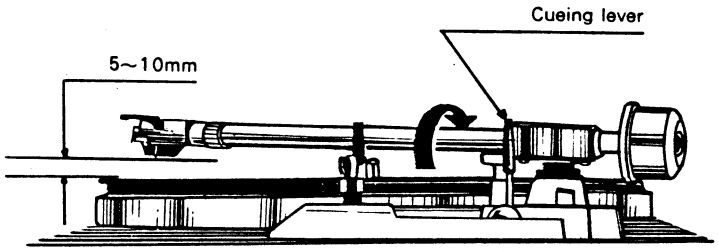


Fig. 2

2. SPEED ADJUSTMENT

* This unit is built-in F·G·SERVO circuit and the speed has been adjusted accurately in the factory.
* If, for any reason, when you change the speed, turn these volumes with the screwdriver to the "+" direction or "−" direction.
  "+" direction ..... This increases the speed.
  "−" direction ..... This decreases the speed.

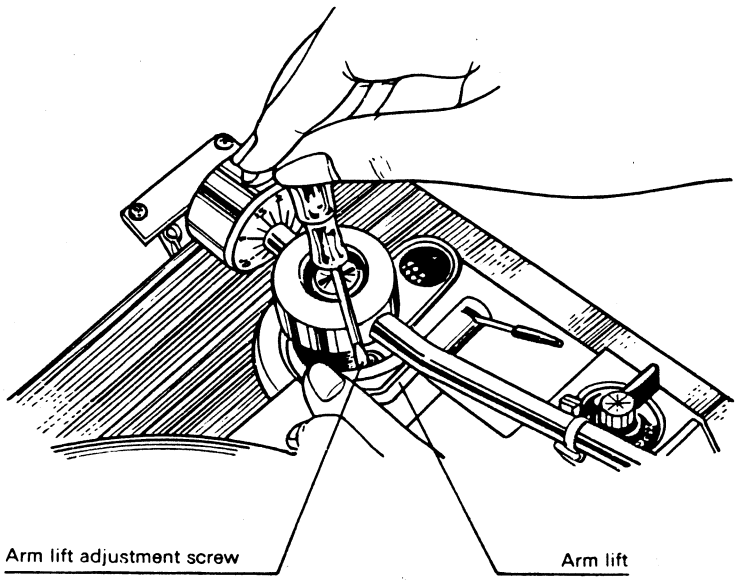


Fig. 3

TURNTABLE SPEEDS (PITCH CONTROLS)

If you wish to adjust the turntable speeds, turn these control knobs to the "+" (increase) or "−" (decrease) direction. (See Fig. 4)

"+" **direction**..... This increases the speed of the turntable platter.
Turn the knob to "+" direction if the strobo dots seem to be "falling back", i.e., seem to be moving counterclockwise.
When the strobe dots appear to be stationary, the speed is accurate.

"−" **direction**..... This decreases the speed of the turntable platter.
Turn the knob to "−" direction if the strobe dots seem to be "running ahead"; i.e., seem to be moving clockwise, until they appear stationary.

NOTE: *Each of the two turntable speeds (33-1/3 and 45 r.p.m.) can be adjusted within a range of 6%.

Any change in powerline frequency will cause a change of the fluctuation rate of the neon or fluorescent lamp used for the illumination of the strobe dots. In such acse the strobe dots will start to move very slightly. Under normal conditions the powerline frequency from Electric Utility Companies is extremely stable. Under certain abnormal conditions, however, changes in line frequency have been observed, averaging to about 0.2 % when measured over a period of time.

Such change in line frequency will in no way affect the quality of the sound reproduction, as a change of line frequency does not change the rotational speed of the turntable.

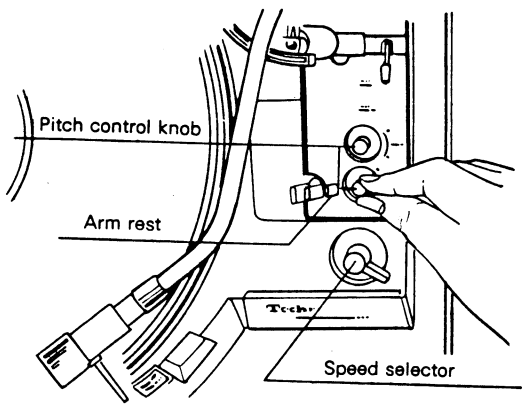


Fig. 4

TONEARM RETURN POINT

In some cases, the tonearm will tend to return to its rest position before playing has finished. In other cases, it may fail to return to the rest position even after playing the last groove of the record.
Rotate this screw to correct for either condition. If the tonearm returns its rest too soon. —Turn this screw counterclockwise.
If the tonearm does not return its rest even after playing the last groove. —Turn this screw clockwise.

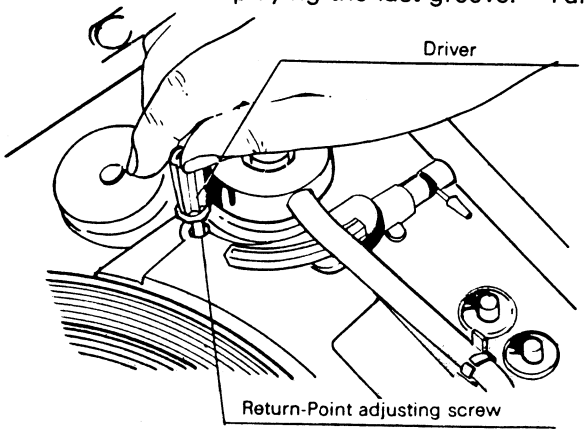
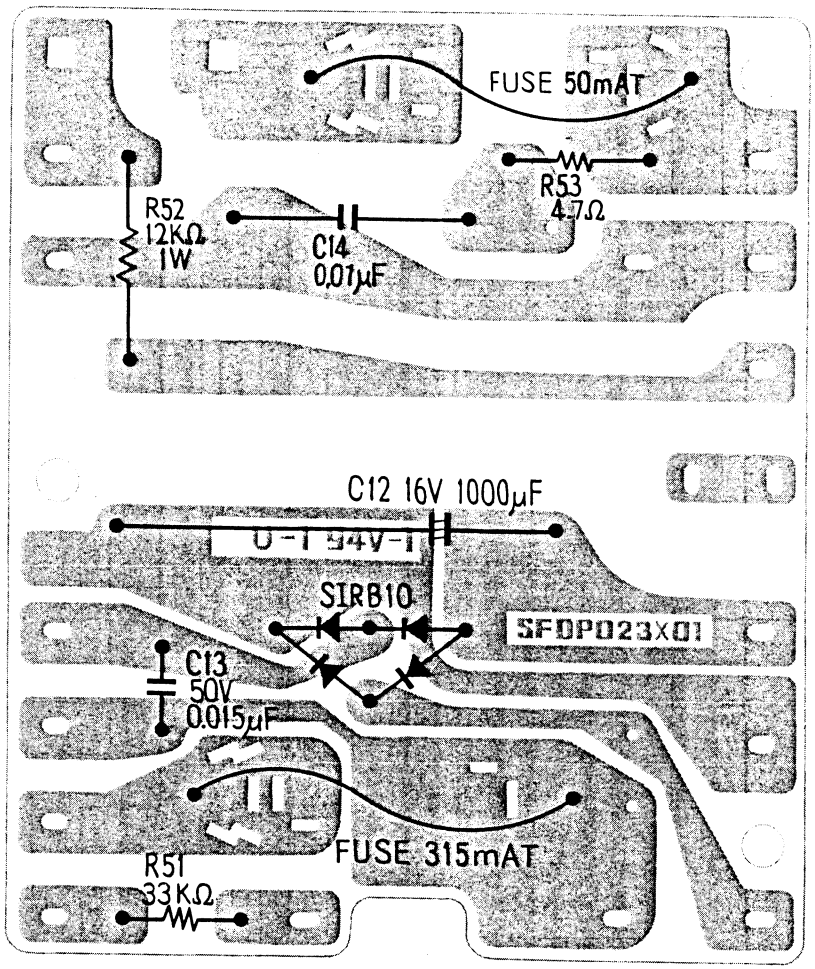
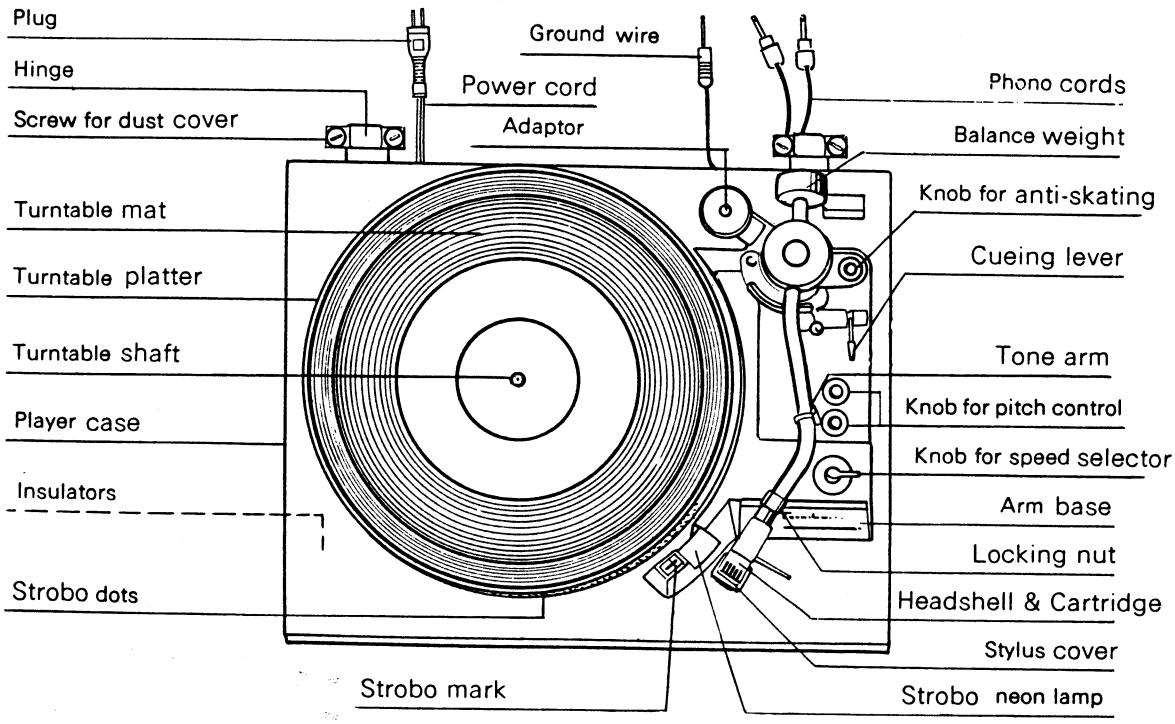


Fig. 5

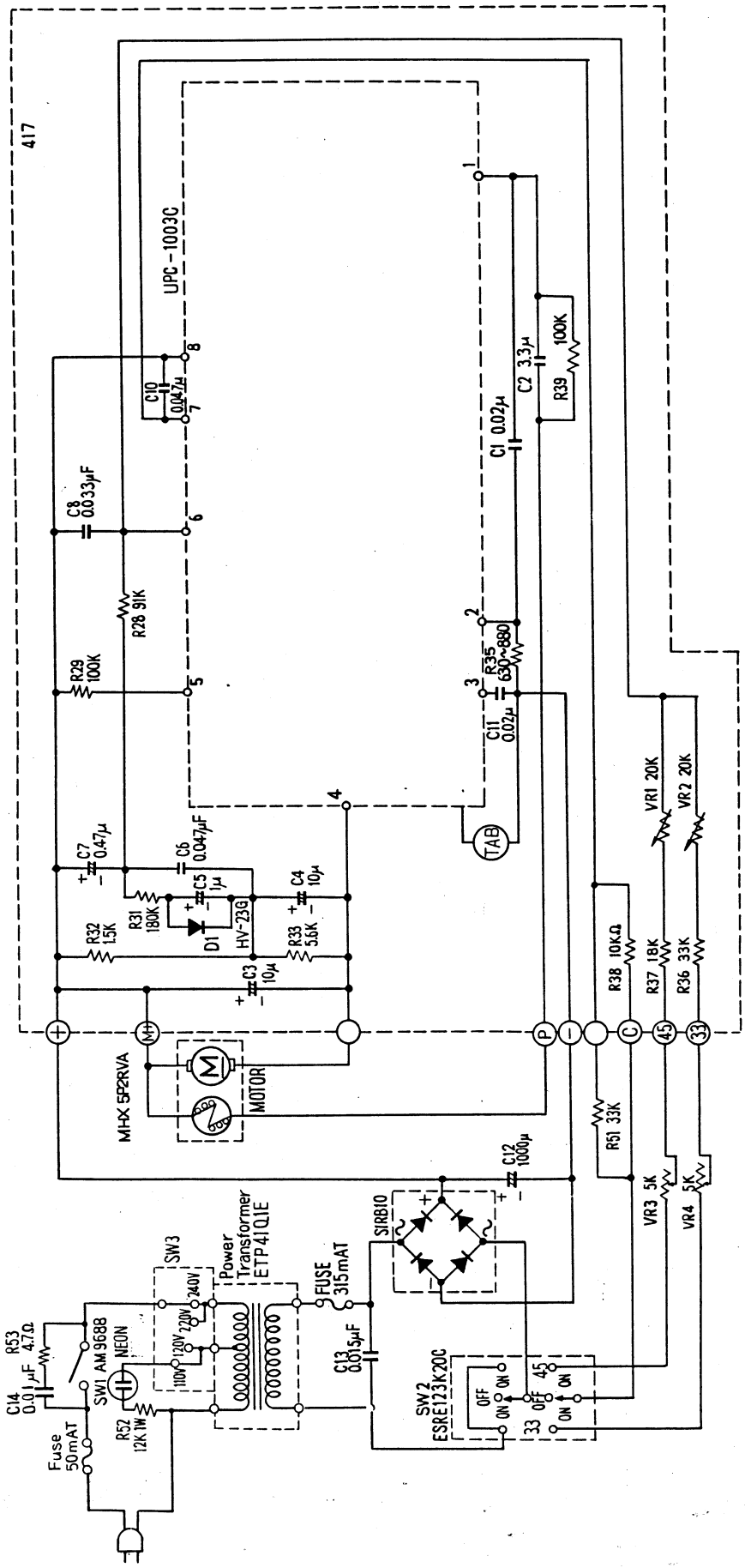
CIRCUIT BOARD SL-23-(X)



LOCATION OF PARTS



SCHEMATIC DIAGRAM SL-23-(X)

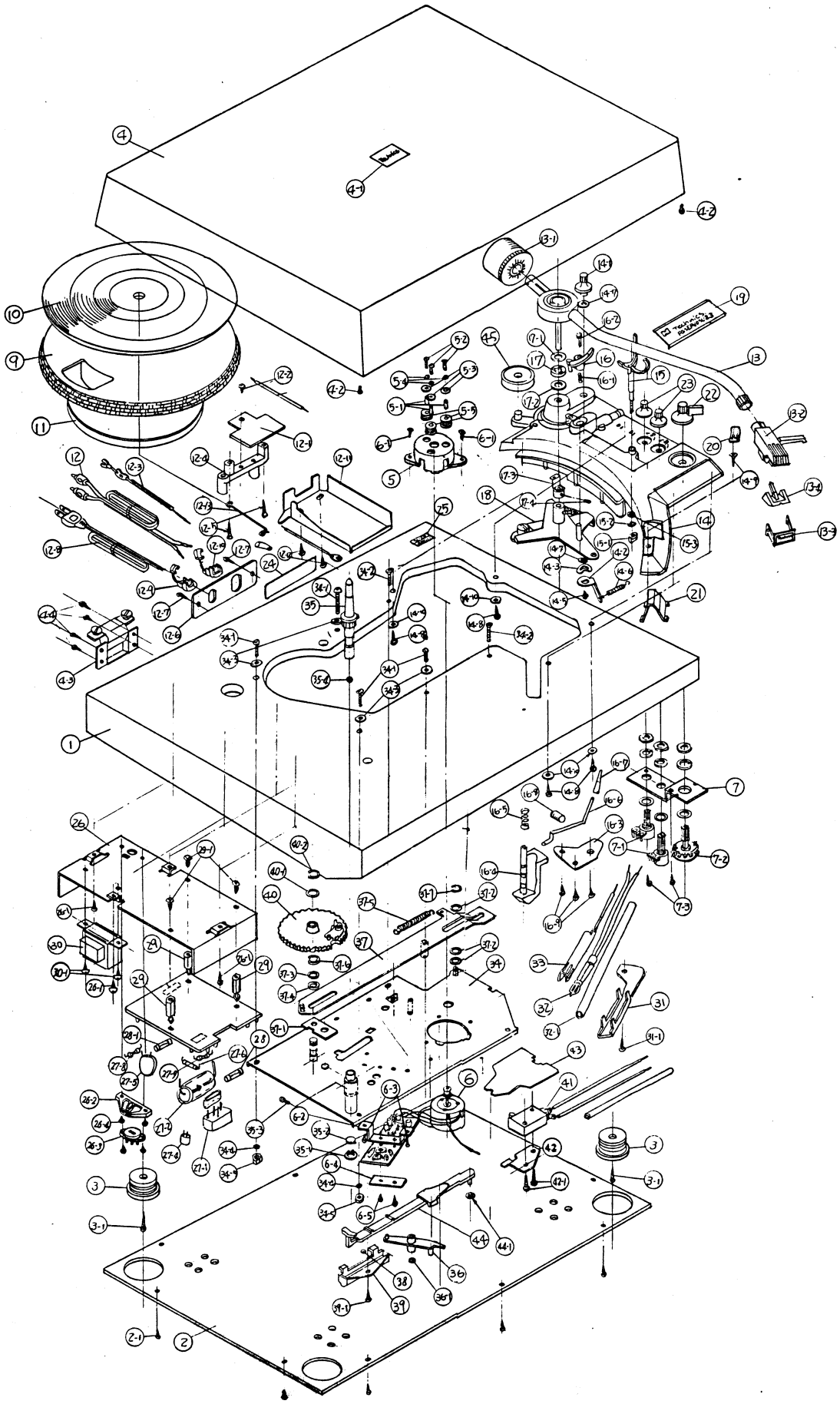


PARTS LIST

NO.	PART NO.	DESCRIPTION	Q'TY	NO.	PART NO.	DESCRIPTION	Q'TY
1	SFAC023X01	Player case	1	13-1	SFPWG22001K	Balance weight	1
2	SFAU023L01	Bottom board	1	13-2	EPC271CES-X	Cartridge with shell	1
2-1	XMS27+13FVC	Screws for bottom board	10	13-3	SFCNC27102K	Stylus cover	1
3	SFGA020L01E	Audio insulators	4	13-4	EPS270ED	Stylus	1
3-1	XMM31+16	Screws	4	14	SFPKD22006	Arm base	1
4	**SFAD020-01**	Dust cover ass'y	1	14-1	SFPJK22003K	Anti-skating force control knob	1
4-1	SFKK020X01	Badge for dust cover	1	14-2	SFPSH22001	Suspension for the anti-skating force cont-	1
4-2	**SFGC040L1**	Cushions for dust cover	2			rol spring	
4-3	SFAT023L01A	Hinges	2	14-3	SFPEW12002	Teflon washer	1
4-4	XMM31+10FZ	Screws	8	14-5	XTW26+5D	Screw	1
5	SFUM023L01	Case for motor	1	14-6	SFPSP12002	Spring for anti-skating	1
5-1	SFXO020L01	Pipe for installation of the motor	3	14-7	SFXW303-1	Washer	2
5-2	XSN26+9	Screws	3	14-8	XTN3+16B	Screw	4
5-3	XWE26D75BW	Washer	3	14-9	XMS31+25	Screw	1
5-4	XWA26B	Spring	3	14-10	XWE3E10	Washers	4
5-5	SFGC020L01	Cushions	3	15	SFPRT22001K	Arm rest	1
6	SFMC023L01E	Motor ass'y (w/capstan & PCB)	1	15-1	XNG26HBN	Nut	1
6-1	XTN3+8B	Screws	2	15-2	XWA26B	Spring-washer	1
6-2	SFUP026L01	P base holder	1	15-3	XWE26E75BW	Washer	1
6-3	XTN3+8B	Screws	2	16	SFPRT22003K	Arm lift	1
6-4	SFUZ825H01	Insulating plate	1	16-1	SFQA829-3	Spring for the arm lift	1
6-5	XTN3+8B	Screws	2	16-2	SFXG829-1	Screw (height adjustment)	1
7	SFUP023L03	Mounting plate for variable resistor	1	16-3	SFPAB22006	Lift base	1
7-1	EVHBOAK15B53	Variable resistor	2	16-4	SFPJL22002K	Lift bar	1
7-2	ESRE123K20C	Speed selector switch	1	16-5	SFPSP3500	Spring for lift	1
7-3	XTN3+8B	Screws	2	16-6	SFPJL22003	Cueing lever	1
9	SFTE023L01	Turntable platter	1	16-7	SFPAB12002	Knob for cueing lever	1
10	SFTG120-01	Turntable mat	1	16-8	SFPGM22001	Gum for cueing lever	1
11	SFGB029-1	Belt	1	16-9	XTN3+5B	Screws	3
12	SFDH020L01	Phono cords	1	17	SFUP890B01E	PU. bearing	1
12-1	SFDP020L02	PU. Print base	1	17-1	SFPEW3500	PU. thrust washer	1
12-2	XTW3+8BFY	Screw	1	17-2	SFPEW22001	PU. thrust washer	1
12-3	SFEL028-01E	Ground wire	1	17-3	SFPJD22003K	PU. stopper	1
12-4	SFUM020L01	Board for installation of the phono cords	1	17-4	XXE3D3FNS	Screws	1
12-5	XMM31+25	Screws	2	18	SFPAB22007K	Plate for PU.	1
12-6	SFUP20L03	Fixing plate for power & PU cord	1	19	SFKK023X01	Plate for arm base	1
12-7	XMM31+13FY	Screws	2	20	SFKK023L02	Strobo mark	1
12-8	SJAA3-1	Power cord	1	21	SFUM023L05	Cover for neon lamp	1
12-9	SFHK040L	Bushing for fixing the power cord	1	22	SFKT020L01E	Knob for speed select	1
12-10	SFSR4N-4	Bushing for fixing the phono cord	1	23	SFKT130-01A	Knob for speed adjustment	2
12-11	SFUP023L04	Shield case	1	24	SFNN023X01	Name plate	1
12-12	XTN3+8B	Screws	2	25	SFNH020X01	Rabel for stylus	1
12-13	SFQS023L01	Spring	1	26	SFUK023L02	Electro base	1
13	**SFPAM22005K**	Tonearm unit	1	26-1	XMM31+8	Screw	4

NO.	PART NO.	DESCRIPTION	Q'TY
26-2	SFUM130G01	Plate for power	1
26-3	SSRA1	Power selector switch	1
26-4	XTN3+8B	Screws	4
			1
27-1	SVDS1RB10	Rectifier	1
27-2	ECEB16V1000L	Capacitor	1
			1
27-4	ECQM05153KZ	Capacitor	1
27-5	ECQE10103MZ	Capacitor	1
27-6	ERG1ANJ123	Resistor	1
			1
27-8	ERD12TJ4R7	Resistor	1
27-9	ERD14TJ333	Resistor	1
28	XBA2C03TR0	Fuse	1
28-1	XBA2C005TR0	Fuse	1
29	SFHZ055-01	Holder for print base	3
29-1	XTN35+8B	Screws	3
30	ETP41Q1E	Power transformer	1
30-1	XTN4+6B	Screws	2
31	SFUP023L02	Radiant plate	1
31-1	XTN3+8B	Screw	1
32	SFDNE2HUWMA2	Neon lamp	1
32-1	**SFEB8UT**	Tube for neon lamp	1
33	SFUP023L05	Shield plate	1
34	SFUK023L01E	Mechanism base	1
34-1	XSN3+30FZS	Screws	4
34-2	XSS3+30FZS	Screws	2
34-3	SFXW120-01	Washers	4
34-4	XWA3B	Spring-washers	6
34-5	XNG3H	Nuts	6
35	SFTJ023L01E	Turntable shaft ass'y	1
35-1	RTW10	C-shaped	1
35-2	SFXW829T03	Thrust washer	1
35-3	SFXG829T01	Screw	1
35-4	SFYB5-32	Ball for turntable shaft	1
36	SFUM023L02	ON-OFF plate for micro switch	1
36-1	**XUC3FT**	E-shaped	1
37	SFUB023L01E	Operating plate ass'y	1
37-1	SFUP827-1	Washer	1
37-2	SFXW028-01	Washers	3
37-3	SFXW702-3	Washer	1
37-4	SFXW623-2	Washer	1
37-5	SFQH623-1	Spring for supporting	1
37-6	**XUC5FY**	E-Shaped	1
37-7	**XUC4FY**	E-Shaped	1
38	SFYB7-32	Ball	1
39	SFUM023L04	Supporting plate for ball	1
39-1	XTN3+8B	Screw	1
40	SFUG825C01A	Main gear	1
40-1	SFXW702-3	Washer	1
40-2	**XUC5FT**	E-Shaped	1
41	AM9688	Micro switch	1
42	SFUP623-5	Cover for micro switch	1
42-1	XTN3+20B	Screws	2
43	SFUP023L01	Insulating plate	1
44	SFUC023L01E	Actuating plate ass'y	1
44-1	CSTW3	Stop ring	1
45	SFWE154A1	45 r.p.m. adaptor	1
	SFCNC8600	Cover for stylus	1
		ACCESSORY PARTS	
A1	SFNU023X01	Operating instructions	1
A2	SQXA2004	Product service guide	1
A3	SFWE154A1	45 r.p.m. adaptor	1
A4	SFDK100G	DIN-PIN adaptor	1
A5	SFDKI19118	2-PIN plug	1
A6	RJP17AS	Adaptor	1
		PACKING MATERIALS	
P1	SFHP023X02	Outside packing case	1
P2	SFHP023X01	Inside packing case	1
P3	SFHD020L01	Upper board	1
P4	SF Z055-01	Side pad	1
P5	SFHH020L01	Corner pad A } (Order as SFHH020L01E)	2
P6	SFHH020L02	Corner pad B } (Order as SFHH020L01E)	2
P7	SFHD020X01	Parts box B	1
P8	SFHH020L03	Parts box A	1
P9	SFYC100A130	Polyethylene sheet for unit	1
P10	SFYF15A20	Polyethylene bag for power cord and phono cords	1
P11	SNE2001	Turntable platter clamping screws	2
P12	SFHS327S	Spacers	2
P13	SFHD020L02	Top lid for parts box A	1

EXPLODED VIEW OF CHANGER SL-23-(X)



TROUBLE SHOOTING GUIDE

* Except when checking voltage, disconnect the power cord before repair without fail.

TROUBLE	CAUSE	REMEDY
Turntable speed A. Switching on does not cause turntable to rotate.	1. Come off belt from capstan (Remove bottom cover and, using DC voltmeter, check printed base voltage)	Install the belt to capstan.
	2. No output of constant-voltage circuit (1) No output on secondary of transformer. * Cord disconnected. * Soldered improperly. * Fuse disconnected. * Power transformer defective.	 * Replace cord. * Solder securely. * Replace fuse. * Replace power transformer.
	3. Output of onstant-voltage circuit is 9.6~14.4V. * Motor ass'y defective.	 * Replace motor ass'y.
	4. Speed selector switch defective * Contact faulty. * Soldered improperly.	 * Replace speed selector switch. * Solder securely.
B. Turntable speed too slow.	1. Constant-voltage output is not 9.6V~14.4V. * Power transformer defective.	 * Replace power trans.
	2. Constant voltage output is 9.6V~14.4V. * Motor ass'y defective. * Speed unadjusted.	 * Replace motor ass'y. * Adjust semi-fixed resistor VR1 & VR2.
C. Turntable speed too fast.	1. Constant-voltage output is not 9.6V~14.4V. * Power transformer defective.	 * Replace power transformer.
	2. Constant-voltage output is 9.6V~14.4V. * Motor ass'y defective. * Speed unadjusted.	 * Replace motor ass'y. * Adjust semi-fixed resistor VR1 & VR2.
D. Turntable speed varies too much.	* Motor ass'y defective. * Belt defective.	* Replace motor ass'y. * Replace belt.
E. Turntable, after stopped by hand, will not tusn or starts turning but will stop soon.	* Motor ass'y defective.	* Replace motor ass'y.
F. Operative at only one of two speeds. (33-1/3 r.p.m or 45 r.p.m)	* Speed selector switch defective. * Leadwire disconnected or unsoldered. * Contact of VR1, VR2 insufficient.	* Replace speed selector switch. * Replace leadwire, or solder securely. * Replace printed base ass'y.
G. When actuating, turntable speed is unsteadly for a long time.	* Motor ass'y defective.	* Replace motor ass'y.
Noise Offensive noise is hears.	* Power transformer makes loud noise of vibration.	* Replace power transformer.

COMPONENT PACKING PROCEDURE